

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A carotenoid overproducing ~~microorganism~~ *E. coli* comprising the genes encoding a functional isoprenoid enzymatic biosynthetic pathway comprising a *deaD* disrupted gene.

Claim 2 (currently amended): The carotenoid overproducing ~~microorganism~~ *E. coli* of Claim 1 wherein the isoprenoid enzymatic biosynthetic pathway comprises:

- a) an upper isoprenoid enzymatic biosynthetic pathway comprising the genes *dxs*, *dxr*, *ygbP*, *ychB*, *ygbB*, *lytB*, *idi*, *ispA*, and *ispB*; and
- b) a lower isoprenoid enzymatic biosynthetic pathway comprising the genes *crtE*, *crtB*, *crtI*, and *crtY*.

Claim 3 (currently amended): The carotenoid overproducing ~~microorganism~~ *E. coli* of Claim 2 wherein the lower pathway optionally comprises genes selected from the group consisting of *crtZ* and *crtW*.

Claim 4-6 (canceled)

Claim 7 (currently amended): The carotenoid overproducing ~~microorganism~~ *E. coli* of either of Claims 2 or 3 wherein the lower pathway genes reside on an autonomously replicating plasmid.

Claim 8 (currently amended): The carotenoid overproducing ~~microorganism~~ *E. coli* of Claim 7 wherein the autonomously replicating plasmid comprises a replicon selected from the group consisting of p15A and pMB1.

Claim 9 (currently amended): The carotenoid overproducing ~~microorganism~~ *E. coli* of either of Claims 2 or 3 wherein the lower pathway genes are chromosomally integrated.

Claim 10 (currently amended): A carotenoid overproducing ~~microorganism~~ *E. coli* according to Claim 1 wherein ~~the microorganism is *E. coli* and wherein~~ the disrupted *deaD* gene has the sequence as set forth in SEQ ID NO:36.

Claim 11 (withdrawn): The carotenoid overproducing microorganism according to claim 10 optionally comprising mutations selected from the group consisting of: a mutation in the *thrS* gene as set forth in SEQ ID NO:35, a mutation in the *rpsA* gene as set forth in SEQ ID NO:37, a mutation in the *rpoC* gene as set forth in SEQ ID NO:38, a mutation in the *yjeR* gene as set forth in SEQ ID NO:39, and a mutation in the *rhoL* gene as set forth in SEQ ID NO:41.

Claim 12 (withdrawn): A carotenoid overproducing *E. coli* comprising:

- a) an upper isoprenoid enzymatic biosynthetic pathway comprising the genes *dxs*, *dxr* *ygbP*, *ychB*, *ygbB*, *lytB*, *idi*, *ispA*, and *ispB*;
- b) a lower isoprenoid enzymatic biosynthetic pathway comprising the genes *crtE*, *crtB*, *crtI*, and *crtY*;
- c) mutations selected from the group consisting of: a mutation in the *thrS* gene as set forth in SEQ ID NO:35, a mutation in the *rpsA* gene as set forth in SEQ ID NO:37, a mutation in the *rpoC* gene as set forth in SEQ ID NO:38, a mutation in the *yjeR* gene as set forth in SEQ ID NO:39, and a mutation in the *rhoL* gene as set forth in SEQ ID NO:41;

wherein the genes of the lower isoprenoid enzymatic biosynthetic pathway reside on an autonomously replicating plasmid comprising a replicon selected from the group consisting of p15A and pMB1.

Claim 13 (withdrawn): The carotenoid overproducing *E. coli* of Claim 12 wherein the lower pathway optionally comprises genes selected from the group consisting of *crtZ* and *crtW*.

Claim 14 (currently amended): A method for the production of a carotenoid comprising:

- a) contacting the carotenoid overproducing ~~microorganism~~ *E. coli* of any of Claims 1-3 with a fermentable carbon substrate;
- b) growing the carotenoid overproducing ~~microorganism~~ *E. coli* of step (a) for a time sufficient to produce a carotenoid; and
- c) optionally recovering the carotenoid from the carotenoid overproducing ~~microorganism~~ *E. coli* of step (b).

Claim 15 (withdrawn): A method for the production of a carotenoid comprising:

- a) contacting the carotenoid overproducing *E. coli* of Claim 12 with a fermentable carbon substrate;
- b) growing the carotenoid overproducing *E. coli* of step (a) for a time sufficient to produce a carotenoid; and
- c) optionally recovering the carotenoid from the carotenoid overproducing microorganism of step (b).

Claim 16 (currently amended): A method according to Claim 14 wherein the carotenoid is selected from the group consisting of antheraxanthin, adonixanthin, astaxanthin, canthaxanthin, capsorubrin, β -cryptoxanthin, didehydrolycopene, didehydrolycopene, β -carotene, ζ -carotene, δ -carotene, γ -carotene, keto- γ -carotene, ψ -carotene, ϵ -carotene, β,ψ -carotene, torulene, echinenone, ~~gamma-carotene, zeta-carotene,~~ alpha-cryptoxanthin, diatoxanthin, 7,8-didehydroastaxanthin, fucoxanthin, fucoxanthinol, isorenieratene, β -isorenieratene, lactucaxanthin, lutein, lycopene, neoxanthin, neurosporene, hydroxyneurosporene, peridinin, phytoene, rhodopin, rhodopin glucoside, siphonaxanthin, spheroidene, spheroidenone, spirilloxanthin, uriolide, uriolide acetate, violaxanthin, zeaxanthin- β -diglucoside, zeaxanthin, and C30-carotenoids.